Seilevel Whitepaper

Whitepaper 1 in a 3 Part Series on
Requirements Management Tools

How to Evaluate and Select a Requirements Management Tool

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Executive Summary

Recognizing the need for a requirements management tool, Seilevel previously evaluated available tools in 2007 to select one for internal use. Since that evaluation, there has been a dramatic shift in requirements management tools and their available features, warranting a new tool evaluation and selection. This paper describes the approach and criteria used in Seilevel's most recent research study to evaluate requirements management tools, including improvements to allow the results to be used by the Business Analyst community.

Introduction to Requirements Management Tool Evaluations

The Tools that Make Our Lives Manageable

How often do you find yourself labeling your requirements document version 22.6, only to find that you and your co-worker made edits to 22.5 at the same time, so now you have two versions of 22.6 that have to be merged? And do you ever find yourself staring at a list of requirements in Microsoft® Excel® wondering if any are missing? Have you been guilty of letting the team build features that are literally never used because they just were not needed for the scope of the project? What about when you sent out version 22.7 for review to 20 stakeholders and got back 133 edits, captured across 30 emails, 42 comments across 6 versions of the document, and 40 changes tracked in 10 versions of the document? Has the project manager ever asked how many of the 540 requirements are approved by the business and you have to literally go count? Or does the business ever approve 80% of the requirements but not the other 20% in your Microsoft® Word document, leaving you to manually track which ones are approved?

As Business Analysts and Product Managers trying to manage our requirements in Word and Excel®, these are the stories of our lives. These stories are also the catalyst behind us begging our managers to buy us requirements management tools to allow us to focus on eliciting and writing good requirements, as opposed to administering numerous document edits. On the positive side, it does seem that requirements management tools are gaining acceptance in the overall suite of applications needed to execute software projects. If we go back in history far enough, source control tools took a similar path in development organizations. At first, developers resisted source control tools because the tools added extra steps to their job. Then one by one, developers started to lose their code edits, such that now, they see source control tools as a basic necessity to do their job.

Requirements management tools are critical to successful software projects for a variety of reasons. They allow us to have one source of record for collaborating on requirements, as opposed to tripping over each other's document versions. They allow linking requirements to one another and linking to their business objectives to identify any unnecessary scope or missing scope in the requirements. The tools help us produce outputs that our business users can review and track the history of their edits within a master set of requirements, so that months later, we have context for decisions made.

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There is a broad set of requirements tools used in requirements efforts that handle functions such as elicitation, prototyping, voting, and managing product backlogs. In fact, some of the requirements management tools today handle these additional functions. However, the Seilevel research study is focused on

requirements management tools specifically. Researchers vary a bit when they define requirements management; however, Seilevel is defining requirements management tools to be those that support:

- storing specified requirements and their related artifacts, such as models
- allowing links between requirements objects in the tool
- reviewing and tracking changes to requirements
- importing and exporting requirements

History of Requirements Management Tool Evaluations

Historically, Seilevel's customers have asked for recommendations on which requirements tool is the best. The issue with this question is that it assumes one size fits all, which is far from the case when it comes to requirements management tools. One organization might have 100 Business Analysts and existing defect tracking software in place, and want a tool that can integrate to their existing defect tracking software so they can more closely track which defects are due to issues in the requirements. Another organization might have six Business Analysts and a very small budget, but needs a tool to show traceability between objectives and requirements for government compliance reasons. These two organizations would probably select different tools to support their needs.

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In 2007, Seilevel conducted a requirements management tool study to select a tool for use on customer projects that had no other tool in place. That evaluation started by informally looking at demos of approximately ten tools, and three tools were selected for further analysis against 150 prioritized criteria. In addition to the total score calculated based on their capability to support the criteria, additional demos and discussions took place with the sales and product management teams for those tools to gain a deeper understanding of the usability of the tools. Ultimately, Seilevel chose one tool to use internally based on that evaluation.[1]

In the four years since Seilevel conducted its first tool search, there have been drastic changes in the requirements management tools landscape. There are new vendors entering the requirements management tool space as strong contenders. Additionally, there have been other studies conducted or updated based on information from recently released tools. For example, the INCOSE Requirements Management Tools Survey is being updated regularly to reflect new feature support by vendors.[2] Similarly, Volere offers an online repository of tools with quick summaries on those tools.[3] With the aim to supplement the existing research, Seilevel is undertaking a new evaluation effort of the requirements management tools available.

Seilevel Requirements Management Tool Evaluation

Evaluation Purpose

When Seilevel decided to undergo another internal requirements management tool search, there was an opportunity to share the process and results with the Business Analyst community so other organizations could simplify their own search for a tool that fits their specific needs. The results are similar to what INCOSE provides in their Requirements Management Tool Survey[4] in that they are public, free, and compare a number of tools against the same set of features. There is one major difference though, in that Seilevel has one consistent party performing the evaluations across all tools in contrast to the INCOSE study, where the vendors themselves complete evaluations on their own tools. In performing the evaluation this way, we eliminated bias by employing a third-party researcher with no affiliation to any of the vendors. We also reduced the risk of interpreting the criteria differently when multiple people evaluate the same set of criteria across the various tools.

Evaluation Approach

Seilevel's evaluation approach utilizes the vendor selection process outlined in "How to Select the Right Vendor for Your Project."[5] However, the 2011 evaluation updated the research approach that was applied in the 2007 evaluation to incorporate more tools, additional criteria, and a vendor response opportunity.

Evaluation Approach	
1	Create a complete list of possible requirements tools for evaluation
2	Create a prioritized list of criteria for the tools
3	Select a shorter list of first pass criteria from the full set of criteria
4	Filter list for strict requirements management tools, excluding those for requirements definition, prototyping, and agile-specific projects
5	Publish the requirement management tool criteria and tool list for industry review
6	Evaluate the full requirements management tool list against the first pass criteria
7	Evaluate top 15 tools from first pass evaluation against full criteria list
8	Have the top 15 tool vendors evaluate their tools against the same criteria, looking for discrepancies
9	Publish the detailed requirements management tool evaluation results for industry review
10	Implement and evaluate top three tools from the full evaluation on actual projects
11	Publish the requirements management tool evaluation results from on-project use

Table 1. The Seilevel eleven-step approach to evaluating requirements tools.

Evaluation Criteria

The criteria list used on this evaluation went through rigorous scrutiny at Seilevel before the evaluations began. The criteria list primarily consists of features important in managing requirements, and does not encapsulate the features of definition tools, prototyping tools, or agile tools. Some of the criteria originated in the 2007 Seilevel study, some criteria were inspired by the INCOSE Requirements Management Tool Survey[6], and other criteria came from brainstorming with Business Analysts and Product Managers on various projects. The team identified actors and use cases of a requirements management tool as well, and although the primary actor of focus is a Business Analyst, there are a few use cases for managers, developers, and business users. Traceability analysis was performed on the criteria and use cases, helping to minimize any missed criteria or use cases. Once a full set of criteria was established, the use cases and criteria were prioritized using this scale:

Priority	Definition
3	High, must have functionality
2	Medium, nice to have functionality, primarily provides flexibility
1	Low, functionality that is not important but would make the tool easier to adopt or use

Table 2. Criteria priority definitions.

The full criteria list includes approximately 200 features representing functionality and 30 representing pricing or technology items and can be found online[7].

The criteria were further evaluated to identify a key set that would be used in a first pass evaluation to narrow the list of tools being studied. The first pass criteria were selected by looking for criteria that were fundamental to a requirements management tool such as “Traceability analysis to identify missing links within the requirements” and “Create baselines of requirements”. The first pass criteria also included a few items that were deemed important to the adoption of a tool or were likely differentiators between tools, such as “Bulk enter requirements in the tool directly” and “Model process flows directly in the tool”. The first pass list of criteria was approximately 30 items.

A sample of some of the evaluation criteria

ID	Use Case	UC Priority	Category	First Pass	Feature	Priority
1	BA adds new requirements individually	3	Edits	obvious?	Add new requirement	3
11	BA makes updates to requirements	3	Edits	obvious?	Edit requirements	3
8	BA adds a bulk of new requirements at once	3	Import	yes	Automatically identify requirements from external text document by key words, structure, etc. (e.g. specify what keywords to search for in the doc and import based on those)	3
9	BA adds a bulk of new requirements at once	3	Import	yes	Batch import structured data as new requirements from Excel (e.g., import Excel file of previously developed requirements into the new managed system)	3
13	BA is trying to find gaps in requirements	3	Traceability	yes	Create links between requirements of the same type	3
15	Look at a set of requirements to take action on a group of them	1	Custom views	yes	Filter a view of requirements by criteria (e.g., view all requirements in Draft status)	3
25	BA is trying to find gaps in requirements	3	Traceability	yes	Traceability analysis to identify missing links within the requirements (e.g., functional requirement orphans not linked to a use case)	3
31	BA exports requirements for review outside the tool	3	Export	yes	Export requirements to Word (doc or rtf)	3
36	Requirements architect wants to setup information management structure for the project	3	Requirements architecture	yes	Define what data should be captured for each type of requirement (i.e., create custom data fields, specify if the information is required/optional, etc.)	3
39	Requirements architect wants to setup information management structure for the project	3	Requirements architecture	yes	Group requirements by project (i.e., system supports multiple projects)	3
41	BA rolls back/Reviews a prior set of requirements	2	Baselines	yes	Create baselines of the requirements	3
46	BA wants to understand what changes were made to a requirement	2	History	yes	Automatically maintain audit trail for requirement changes (user, time/date, annotation of change, and change detail)	1
58	IT enhances functionality of the RM tool	1	Extensibility	yes	External API available	1
61	BA is offline and needs to continue work on the requirements	3	Offline/Online	yes	Provide ability to work disconnected (i.e., no connection to requirements repository) and merge changes upon reconnecting (may require user to trigger)	1
75	BA wants help on how to use the tool	2	Help	yes	Availability of documentation (either online, soft-copy, or hard-copy)	1

Fig. 1. Some of the criteria used in the Seilevel evaluation process.

Tools Selected for the Evaluation

The original list of tools used in the evaluation was a collection distilled from past knowledge about tools, the INCOSE survey tools[8], internet search results for tools that advertise requirements management features, suggestions from colleagues, tool vendors seen at conferences, and customers' existing requirements management tool selections. After quick investigation into the tools, it became apparent some of the tools were not requirements management tools and therefore would score low against the criteria. The tool list was immediately categorized into: Requirements Management, Requirements Definition, Mockups (or Prototyping), and Agile Specific. Of the 125 tools, there were only 60 that met the criteria of requirements management tools. Given that it was going to take too long to evaluate 60 tools against the full criteria list, the first pass criteria list was used instead to narrow the list of tools for a full evaluation. Again, a few tools were dropped when it was determined they had very few features or truly were not requirements management tools. **Ultimately, 16 tools were selected for full evaluation against the 200 criteria**.

Tool	Tool Vendor URL
IBM Rational DOORS	http://www-01.ibm.com/software/awdtools/doors/productline/
Siemens Teamcenter	http://www.plm.automation.siemens.com/en_us/products/teamcenter/
Blueprint Requirements Center	http://www.blueprintsys.com/
eDevTECH inteGREAT Requirements Studio	http://www.edevtech.com/requirements_studio.html
IBM Rational Composer	http://www-01.ibm.com/software/awdtools/rrc/
3SL Cradle	http://www.threesl.com/
Microsoft Team Foundation Server	http://www.microsoft.com/visualstudio/en-us/products/2010-editions/team-foundation-server/overview
Jama Software Contour	http://www.jamasoftware.com/contour/
Polarion Requirements	http://www.polarion.com/products/requirements/index.php
HP Quality Center	http://www8.hp.com/us/en/software/software-product.html?compURI=tcm:245-937045-&pageTitle=quality-center
Orcanos Qpack	http://www.orcanos.com/Orcanos_QPack.htm
TraceCloud	http://www.tracecloud.com/GloreeJava2/jsp/WebSite/TCHome.jsp
Sparx Systems Enterprise Architect	http://www.sparxsystems.com/products/ea/index.html
Kovair Application Lifecycle Management	http://www.kovair.com/alm/index.aspx
TechnoSolutions TopTeam Analyst	http://www.technosolutions.com/topteam_requirements_management.html
MKS Integrity	http://www.mks.com/platform/our-product
Micro Focus Caliber RM/RM	http://www.microfocus.com/products/caliber/caliberrm/index.aspx

Table 3. The final 16 tools selected for full evaluation against 200 criteria.

Evaluation Score Sheet

The short list of tools that were evaluated against the full set of criteria were done using demo copies of the tool or having a vendor demo specific functionality. For each tool's evaluation, each of the criteria was given a score based on the following scale:

Score	Feature Support
3	Fully supported in the tool
2	Supported but minor workarounds required or detailed functionality missing
1	Only slightly supported with major workarounds required or very minimal functionality
0	No support

Table 4. Criteria score definitions.

Those scores were then tallied by taking a given criteria's priority and multiplying by the tool's score for that criteria to get a weighted score. The weighted scores are summed for all criteria to give the tool a total score.

Weighted Score =
Criteria Priority x Tool Score for Criteria

Total Score =
Sum of Weighted Scores for all Criteria

In addition, vendors were asked to self-evaluate their tools against the same criteria using the same scoring system. The reason for this was to catch any missed functionality by the Seilevel evaluator. For example, if the evaluator could not find a feature due to it not being supported in the limited trial demo they were using, they scored it as a 0. Meanwhile, the vendor scored it as a 3, knowing that the feature was supported out-of-the-box. These types of cases warranted further investigation to reconcile any differences in the evaluator and vendor ratings.

It is important to note that the "Total Score" is actually far less important than the individual "Tool Scores for Criteria" for other organizations using this research to select a requirements management tool. Every tool in the evaluation has strengths that make it a fit for some situation. Any given organization hoping to use these results to select a requirements management tool should properly prioritize the criteria for what is important in that organization and use the calculated weighted scores to make a tool selection customized for their needs.

Conclusions and Next Steps

This first whitepaper in our requirements management tool series describes the process Seilevel followed for evaluating requirements management tools in an approach that produces results useful to the broader Business Analyst community. The results of the detailed evaluation of the selected 16 tools are covered in a second paper in this whitepaper series. The results of Seilevel implementing the top three tools from the full evaluation on real projects are in a third paper in the series. The last phase of research helps determine if the tools evaluated in real-world trials have similar results as to what the evaluation against criteria determined.

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Author Biographies

Joy Beatty is Vice President of Blue Ocean Services at Seilevel, a professional services company focused exclusively on helping clients change the way they create requirements in order to enhance business outcomes. A managing principal at Seilevel, Joy drives innovation and development for new methodologies that improve requirements elicitation and modeling, assisting clients as they build business analysis centers of excellence. She also develops the curriculum for Seilevel's well-regarded training, leading select training sessions. To date, Joy has provided training to more than 600 business analysts via professional association seminars, industry conferences, and Seilevel classes. Joy also works on strategic projects as a Requirements Architect. Her expertise is informed by her experience working with numerous Fortune 1000 companies, including Dell, AMD, Spansion, FirstCare, eBay, Lands' End, and Raytheon. She writes about Seilevel methodologies and studies in whitepapers that can be found at http://www.seilevel.com/resources and blog posts that can be found at http://requirements.seilevel.com/blog/.

Remo Ferrari is a professional consultant in Requirements Engineering. He received a M.Sc. and a Ph.D. in Computer Science with a specialization in Software Engineering from the University of Western Ontario, Canada, and has been active in the research areas of Requirements Engineering and Software Architecture. In particular, his work has investigated these areas through an empirical viewpoint, examining such issues as the technical effects an architecture has on new requirements, and the impact of requirements training on conducting software architecting projects. He has published research in prestigious journals such as the Journal of Systems and Software, Information and Software Technology, and the Working IEEE/IFIP Conference on Software Architecture, and has presented at the 17th IEEE International Requirements Engineering Conference.

End Notes

[1] On the Seilevel Requirements Defined Blog, the full process for the Seilevel 2007 requirements management tool survey can be found at: http://requirements.seilevel.com/blog/2007/07/seilevel%E2%80%99s-requirements-management-tool-selection.html

[2] INCOSE provides a Requirements Management Tool Survey in which the vendors complete the survey, updating their results periodically. The survey can be found at: http://www.incose.org/productspubs/products/rmsurvey.aspx

[3] Volere provides a summary of requirements tools and their capabilities at http://www.volere.co.uk/tools.htm

[4] The INCOSE Requirements Management Tool Survey has vendor evaluations with review by INCOSE members for any misrepresentation.

[5] Seilevel's vendor selection process is outlined at http://www.seilevel.com/wp-content/uploads/HowToSelectVendors.pdf

[6] The INCOSE Requirements Management Tool Survey has a foundation list of criteria to evaluate a requirements management tool.

[7] Seilevel's full criteria used in the 2011 evaluation can be found at: http://www.seilevel.com/wp-content/uploads/Requirements-Gathering-Management-Tool-Evaluation-Worksheet.xlsx

[8] INCOSE provides a list of requirements tools and contact information at: http://www.incose.org/productspubs/products/INCOSERMToolSurveyVendorContactInfo.pdf

About Seilevel

Seilevel is a professional services company focused exclusively on helping Fortune 1000 clients redefine the way they create software requirements in order to achieve their business objectives. We do that through workshops, training, and turnkey consulting projects. Seilevel's leadership team train, manage and mentor a highly-skilled group of Product Managers who use our proprietary methods to determine which features create the most value for your business, and then make sure those features, and only those features, get built. Seilevel's innovative approach ensures your large software projects have reduced defects, reduced costs, are brought in on time, and provide greater end-user adoption. Founded in 2000 and headquartered in Austin, 11 years of growth proves Seilevel provides real value to clients like Dell, AMD, Shell, Spansion, FirstCare, eBay, Lands' End, and Raytheon.

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